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ON THE STABILITY OF THE SOLAR SYSTEM.

BY R. J. ADCOCK, MONMOUTH, ILL.

The resultant of parallel forces passes through the centre of inertia.

The forces of attraction of the particles of one body for another, not being generally parallel, their resultant does not pass through their centres of inertia, except in case of spheres and bodies whose particles are symmetrically disposed with refference to the line joining their centres of inertia.

Hence, with these exceptions, the attraction between two bodies has a tendency to give each a rotary motion about its centre of inertia.

The resultant of the forces of attraction of the moon for the earth, in consequence of the tides raised by the moon and the fact that the highest tide is always to the east of the moon, passes about 23 inches to the east of the earth's centre, thereby continually diminishing the rotary motion of the earth on its axis, lengthening the day and diminishing the year as measured thereby, as accurate astronomical observations and calculations must show. The length of the year as determined in the time of J. Cæsar, about 45 B. C., was 365¼ days, which at present is estimated at between 11 and 12 minutes less.

In like manner as the attraction of the moon upon the figure of the earth and the position of that figure as caused by the tides which that attraction produces, continually diminish the rotary motion of the earth on its axis, so the attraction of the sun, must produce a like effect upon the rotary motion of the earth and moon about their common centre of inertia.

When a body revolves about a horizontal axis, to which it is attached by means of an inextensible string, its motion, when acted upon only by the force of gravity, is permanent ; in case the string is either partially or perfeetly elastic, or the body of such elastic material that it is lengthened by the greater velocity in the lower part of its path, its motion will not be permanent, even when there is no resistance from friction or the atmosphere. In consequence of the greater extension being always after it passes the point directly under the axis, in ascending the retardation by the force of gravity is always greater than the accelleration in descending on the other side.

This fact, of the change in the direction and amount of the force of attraction caused by the change of form in consequence of fluieity, is not taken into the account in the article by Mr. Hill, neither is it, in the reasonings of Laplace on the time of the rotary motion of the earth on its axis, nor in the discussion of the subject of perturbations.

The bearing of fluidity upon the stability of the system and the great changes which are to take place, some probably in consequence thereof, are very clearly referred to in the book of Psalms, in the Prophets, by our Saviour himself in the Gospels of Matthew and Mark, by the Apostle Peter, and in the book of Revelation of the Apostle John.

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ON THE SUMMATION OF SERIES.

BY EDGAR FRISBY, ESQ., U. S. NAVAL OBSERVATORY, WASHINGTON, D. C.

Suppose we have a series whose n^{th} term is of the form

$$\frac{u_m}{(a\,x+b)\,(a\,x+a+b)\,(a\,x+2\,a+b)\,\ldots\,(a\,x+\overline{n-1}\,a+b)}$$

where u_m is an algebraic function of x of not greater than $n-2$ dimensions: it can be summed very simply by an ordinary algebraic method in this manner:

Resolve the general term into partial fractions of the form

$$\frac{A}{a\,x+b}+\frac{B}{a\,x+a+b}+\frac{C}{a\,x+2\,a+b}+\ldots\text{\&c.},$$

then we shall have $Au'_{n-1}+Bu''_{n-1}+Cu'''_{n-1}+\ldots\text{\&c}=u_m$ where $u'_{n-1}, u''_{n-1}, u'''_{n-1}$ &c. are algebraic functions of x of the $n-1^{th}$ degree. If now these expressions be expanded, and we equate the coefficients of x^{n-1} we shall have in the case supposed $\because$ m is less than $n-1$
$a^{n-1}(A+B+C+\text{\&c.})=0$ or $A+B+C+\text{\&c}=0.$

$\therefore$ for $x=1, 2, 3, 4$ &c. we shall have

$$\begin{aligned}
&A\left\{\frac{1}{a+b}+\frac{1}{2a+b}+\frac{1}{3a+b}+\frac{1}{4a+b}+\frac{1}{5a+b}+\text{\&c.},\right\}\\
&+B\left\{\qquad\quad\;\frac{1}{2a+b}+\frac{1}{3a+b}+\frac{1}{4a+b}+\frac{1}{5a+b}+\text{\&c.},\right\}\\
&+C\left\{\qquad\qquad\qquad\quad\;\frac{1}{3a+b}+\frac{1}{4a+b}+\frac{1}{4a+b}+\text{\&c.},\right\}
\end{aligned}$$

whose summation will consist of a few only of the first and last terms.

As an example, let $n=5$, $m=3$, $a=1$ & $b=8$ and take the series